(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: 0 464 278 A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 90307284.1

(51) Int. Cl.5: B60R 25/04

(22) Date of filing: 03.07.90

(43) Date of publication of application:
08.01.92 Bulletin 92/02

(84) Designated Contracting States:
DE FR GB IT SE

(71) Applicant: Wake, Kiyoyasu
57-1, 3-chome, Utsukushigaoka, Midori-ku
Yokohama-shi, Kanagawa-ken(JP)

(72) Inventor: Wake, Kiyoyasu
57-1, 3-chome, Utsukushigaoka, Midori-ku
Yokohama-shi, Kanagawa-ken(JP)

(74) Representative: Sturt, Clifford Mark et al
MARKS & CLERK 57-60 Lincoln's Inn Fields
London WC2A 3LS(GB)

(54) Burglarproof device for vehicle.

(57) This invention relates to a burglarproof device for a vehicle, which is adapted to prevent that the engine for a vehicle is started by unjust means such as a duplicate key, direct connection of electric wires, or the like, whereby the vehicle is stolen.

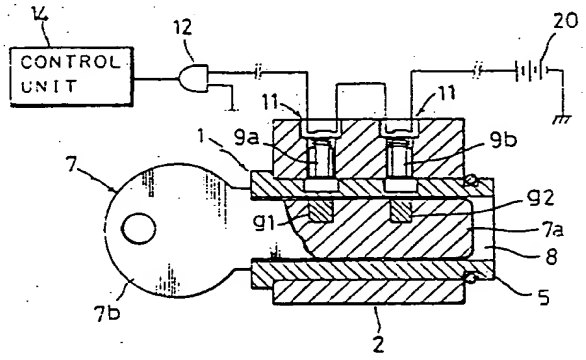
The key cylinder lock (1)is comprised of an outer tubular member (2), and an inner tubular member (5) rotatably provided within the outer tubular member. A normal magnet key (7) having a magnet (G1, G2) is inserted into the inner tubular member (5).

In the outer tubular member, there is provided at least one switch member (11) which is turned ON when the normal key is inserted into the inner tubular member.

There is provided input signal discrimination means (12) for cutting off output signals to supply elements essential for the operation of an engine for a vehicle in the case of a key except for the normal magnet key using, as information, a power supply signal delivered from the power supply (20) through one or a plurality of switch members (11).

In another embodiment, there is provided a central processing unit operative to discriminate between presence and absence of power supply signals respectively delivered from a plurality of switch members provided in the outer tubular member to deliver output signals to supply elements essential for the operation of the engine for vehicle only when the normal magnet key is inserted into the inner tubular member.

Fig. 4



EP 0 464 278 A1

BACKGROUND OF THE INVENTION

This invention relates to a burglarproof device for a vehicle.

Conventionally, as the device of this kind, there is an embodiment disclosed in, e.g., Japanese Patent Application Laid Open No.5621/89. This embodiment essentially comprises a key switch unit having a key switch provided in a steering column on the vehicle side, a control unit for controlling starting of an engine, and a key unit adapted to be inserted into the key switch unit to permit the engine to be started.

However, the above-mentioned embodiment has the following drawbacks recited below.

(1) In the key unit and the control unit, transmitters each including a CPU for memorizing specific codes set every respective vehicles are incorporated therein, respectively. Thus, such units are of complicated structure as a whole.

(2) The key unit includes therein a CPU, and further includes a light emitting element, a plurality of contacts, and the like, that is, electronic elements are complicatedly combined in the key unit. For this reason, there is high possibility that the key unit becomes out of order.

If the key unit itself has become out of order, there would occur an inconvenience such that the engine cannot be started by ant means by the key operation.

SUMMARY OF THE INVENTION

With the above-mentioned drawbacks with the prior art in view, an object of this invention is to provide a burglarproof device for a vehicle, which prevent an engine from being started by unfair or illicit means such as a duplicate key or direct connection of electric wires, etc., which can eliminate the inconvenience that the engine is unable to be started by troubles of the key itself and/or troubles of the key cylinder lock, and which is unnecessary to take various procedures until starting of the engine.

A burglarproof device for a vehicle according to this invention comprises a normal magnet key adapted to be inserted into a key cylinder lock for a vehicle, a switch member provided in the key cylinder lock, which is opened and closed in response to insertion and detachment of the magnet key, and input signal discrimination means for cutting off output signals to supply elements essential for the operation of an engine for a vehicle in the case of a key except for the normal magnet key using, as information, a power supply signal delivered from a power supply through the switch member.

In another embodiment, there is provided a central processing unit (CPU) operative to discriminate between presence and absence of power supply signals respectively delivered from a plurality of switch members provided in the key cylinder lock to deliver output signals to supply elements essential for the operation of the engine for vehicle only when the above-mentioned normal magnet key is inserted into the key cylinder lock.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIGS. 1 to 14 show a first embodiment of this invention. More particularly, FIG. 1 is a model view showing an arrangement of the first embodiment of this invention, FIGS. 2 to 5 are schematic explanatory views showing essential parts of this invention, respectively, FIGS. 6 and 7 are explanatory views showing switch members of this invention, respectively, FIG. 8 is an electric block diagram of the first embodiment shown in FIG. 8, and FIGS. 9 to 14 are explanatory views showing different modified embodiments of the first embodiment, respectively.

FIGS. 15 to 20 show a second embodiment of this invention. More particularly, FIG. 15 is a model view showing an arrangement of the second embodiment, FIGS. 16 to 19 are schematic explanatory views showing essential parts of the second embodiment, respectively, and FIG. 20 is an electric block diagram of the second embodiment shown in FIG. 15.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of this invention will be described in detail with reference to the attached drawings.

FIGS. 1 to 14 show a first embodiment of this invention.

In FIG. 1, reference numeral 1 denotes a key cylinder lock constituting a part of an ignition coil or a key switch 1A for a switch provided at a handle column of an automotive vehicle. This key cylider lock 1 is constituted, e.g., as shown in FIGS. 2 to 5.

Namely, reference numeral 2 denotes an outer tubular member having a predetermined length. An outer hole 3 and an inner hole 4 communicating with each other and intersecting with each other are provided in the outer tubular member 2 from a suitable portion of the outer circumferential portion toward the radial direction. In this embodiment, two penetration holes each comprised of outer hole 3 and inner hole 4 are formed at a required interval.

Reference numeral 5 denotes an inner tubular member rotatably received over a predetermined

angular range within the outer tubular member 2. Grooves 6 of a suitable size are formed at portions corresponding to the above-mentioned penetration holes of the outer circumferential portion of the inner tubular member 5. respectively. At the central portion of the inner tubular member 5. respectively.. At the central portion of the inner tubular member 5. a key hole 8 corresponding to a key body 7a of a magnetic key 7 shown in FIG. 4 is opened.

Reference numeral 9 denotes movable obstruction elements each accommodated within both the inner hole 4 of the outer tubular member 2 and the groove 6 of the inner tubular member 5. In this embodiment. a plurality of magnet pin tumblers 9a and 9b are used. Each movable obstruction element 9 is biased toward the groove 6 of the inner tubular member by a spring member 10 having a relatively weak spring force fitted into the inner hole 4 of the outer tubular member in a locked state or before the magnet key 7 is inserted. This magnetic key 7 is comprised of a key body 7a inserted into the key hole and a holding portion 7b integrally formed with the key body 7a. As shown in FIG. 4, a plurality of magnets g1 and g2 are embedded at the upper side portion of the key body 7a with a predetermined spacing therebetween. The polarities of these plural magnets g1 and g2 may be arbitrarily combined.

Reference numeral 11 denotes a switch member which is provided in the key cylinder lock 1 of the key switch 1A for an ignition switch. and which is opened and closed in dependency upon the insertion into the key hole 8 of the magnet key 7 and the detachment therefrom. In this embodiment, as shown in FIG. 4, for this purpose, there is provided a magnetic responsive switch which detects that the movable obstruction element 9 jumps up against the spring force of the spring member 10 from the groove 6 of the inner tubular member by insertion of the magnet key 7 and becomes close to the switch, whereby the magnetic responsive switch is brought into a closed state. As the magnetic responsive switch 11, there may be used, e.g., a switch member 11A comprising a fixed contact piece 11a as a fixed contact and a movable contact piece 11b as a movable contact as shown in FIG. 6 or a magnetic responsive lead switch 11B as shown in FIG. 7.

In this embodiment, switch members 11 using a magnetic responsive switch are suitably assembled into a plurality of outer holes 3 of the outer tubular member 2 as shown in FIGS. 2 to 4, respectively. Respective switch members 11 and 11 are connected in series and are protected by a cover member (not shown).

Reference numeral 12 denotes input signal discrimination means operative to cut off output signals to supply elements essential for the operation of an engine for a vehicle in the case of a key except for the normal magnet key 7 using, as information, a power supply signal delivered from a power supply; e.g.. a battery 20 mounted in the vehicle which will be described later in this embodiment. As the input signal discrimination means 12. e.g.. an AND circuit may be used.

In this embodiment, as shown in FIG. 8, the AND circuit 12 is connected between the switch member of the key cylinder lock 1 and a control unit 14 including a main CPU 13 for controlling the drive of the engine. One input terminal of the AND circuit 12 is connected to the switch member 11 side. and the other input terminal thereof is connected to the terminal side of the ignition coil or the ignition switch. Further. the output terminal of the AND circuit 12 is connected to the input terminal of the main CPU 13.

Reference numeral 15 denotes a fuel injection unit. reference numeral 16 an engine ignition unit. and reference numeral 17 respective essential elements such as a capacitor. These components are connected to the CPU 13 of the control unit 14, respectively. As long as outputs from the above-mentioned essential supply elements are not delivered to the engine. the engine is not operated. Further. reference numeral 18 denotes an essential element such as a fuel injection pump connected between the AND circuit and the control unit 14 for engine especially in the case of a diesel engine. As long as this element is not activated. the engine is not normally operated.

In addition, reference numeral 19 denotes a starter motor connected through the key switch 1A and the magnet switch, and activated by a rotational operation of the magnet key 7 using the battery 20 mounted in the vehicle as a power supply.

In the above construction of the first embodiment, as shown in FIGS. 2 and 3, before the magnet key 7 is inserted into the key hole 8 of the key cylinder lock 1, a plurality of magnet pin tumblers 9a and 9b each serving as a movable obstruction element are thrust by the spring members 10, so they are positioned within the grooves 6 and a plurality of magnetic responsive switches 11 each serving as a switch member are in a closed state, respectively.

On the other hand, as shown in FIGS. 4 and 5, when the normal magnet key 7 is inserted into the key hole 8 of the key cylinder lock 1, magnetic forces of the magnets g1 and g2 embedded in the magnet key 7 are exerted on corresponding magnetic pin tumblers 9a and 9b having the same polarity, respectively. As a result, the magnetic pin tumblers 9a and 9b jump upwardly against the spring force of the spring members 10 from the

grooves 6, and become close to the magnetic responsive switches 11, respectively. Thus, respective magnetic responsive switches 11 detect such changes and are brought into a closed state, respectively. As a result, a power supply signal is delivered from the battery 20 mounted in the vehicle as a power supply to the AND circuit 12 through these magnetic responsive switches 11.

It is to be noted that as long as the magnet key is inserted into the key hole, even if the magnetic key 7 is rotationally moved, since respective magnet pin tumblers 9a and 9b are supported on the outer circumferential surface of the inner tubular member 5, the above-mentioned state is continued.

An output signal produced as the result of the fact that the magnet key 11 is rotationally moved, so the key switch 1A is passed through the "ON" position is inputted to the AND circuit 12. This AND circuit 12 discriminates that both signals are inputted at the same time to deliver an output signal to the control unit 14 for engine. Thus, the control unit 14 drives and controls the ignition unit 16, the fuel injection unit 15 for engine, and the like to set the starter motor 19 at the position of "ST", whereby the starter motor 19 is rotated and the engine is started.

On the other hand, in the case where a key except for the normal magnet key 7 is inserted into the key hole 8 of the key cylinder lock 1, the movable obstruction element 9 does not entirely move, or all magnet pin tumblers 9a and 9b do not jump up. As a result, the magnetic responsive switch 11 is not entirely brought into a closed state, or all magnetic responsive switches 11 are not brought into a closed state. Accordingly, a power supply signal is not delivered from the power supply 20 to the AND circuit 12 through the switch member 11. Therefore, even if a procedure is taken to rotate the magnet key 7 to start the starter motor 19, no output signal is delivered from the AND circuit 12 to the control unit 14, with the result that the engine is not started.

A different modified embodiment of the above-mentioned first embodiment of this invention will now be described. The same or similar reference numerals are attached to the same portions as those of the first embodiment, respectively, and their repetitive explanation will be omitted.

In the embodiment shown in FIGS. 9 to 14, the structure of a key cylinder lock 1a mainly differs from that of the above-described embodiment of this invention.

Namely, reference numeral 1B denotes a key switch for an ignition switch and reference numeral 1a a key cylinder lock. This key cylinder lock 1a essentially comprises an outer tubular member 2a, an inner tubular member 5a rotatably provided within the outer tubular member 2a, and driver pins 26 adapted to thrust movable pins 25 provided in the outer tubular member 2a and provided in the inner tubular member 5a by spring members 10a in a radial direction of the key hole 8a for a magnet key 7A at all times. At suitable portions of thin thickness of the outer tubular member 2a, there are formed a plurality of penetration holes 27 adapted so that a plurality of magnetic responsive switches 11c each serving as a switch member can be fitted.

Further different point is that, as shown in FIGS. 13 and 14, signal hold means 28 for temporarily holding an output signal delivered to the AND circuit as input signal discrimination means 12a is provided between the key switch 1B and the AND circuit 12a.

In the above-mentioned construction, when the normal magnet key 7A is inserted into the key hole 8a of the key cylinder lock 1a, respective magnetic responsive switches 11C (S1) and 11C (S2) of the key switch 1B are turned ON. Thus, the relay of the signal hold means 28 is turned ON.

When the magnet key 7 is rotated, since the magnets g1 and g2 of the magnet key 7A are away from the magnetic responsive switches 11C (S1) and 11C (S2), these switches are turned OFF, but the relay of the signal hold means 28 holds an output signal from the magnetic responsive switch 11C side as it is. As previously described, when the key switch 1B is passed through the position of "ON", the switch S3 is turned ON. By a current on the signal hold means 28 side and a current in the switch S3 on the key switch 1B side, the AND circuit 12A becomes operative to deliver its output signal to a control unit 14a for engine.

On the other hand, when a push button 29 for drawing out a key provided in the handle column shown in FIGS. 13 and 14 at the time of drawing out the magnet key 7A from the key cylinder lock 1a is pushed down, the switch S4 interlocking with the push button 29 is turned ON. As a result, the relay of the signal hold means 28 is turned OFF. Until the magnet key 7A is inserted into the key cylinder lock 1a next time and the magnetic responsive switches S1 and S2 are turned ON for a second time, the relay of the signal hold means 28 is kept in an OFF state.

Accordingly, also in this embodiment, when the normal magnet key 7A is used, an output signal is delivered from the AND circuit to the control unit 14a for engine. Thus, when the starter motor is activated, the engine is started. On the other hand, in the case of a key except for the normal magnet key 7A, even if the starter motor is activated, the engine is not started.

It is to be noted that the supply elements essential for the operation of the engine should be taken as units or members which would fail to

normally operate the engine if there is lacking in any one of them, such as, for example, ignition unit, fuel injection unit for engine, fuel pump, starter motor, and the like.

Accordingly, an arrangement may be employed such that an AND circuit 12 is provided in the electric circuit between the switch member 11 of the key cylinder lock 1 and the starter motor 19 in order that the starter motor 19 is not activated even if the magnet key is rotated and an output signal is thus delivered to the control unit.

A second embodiment of this invention shown in FIGS. 15 and 20 will now be described in detail.

In explanation of this embodiment, the same portions as those of the above-mentioned first embodiment will be briefly described.

Reference numeral 51 denotes a key cylinder lock. Reference numeral 52 denotes an outer tubular member including an outer hole 53 and an inner hole 54. Five penetration holes in total each comprised of outer hole 53 and inner hole 54 are formed. Reference numeral 55 denotes an inner tubular member including grooves 56 and a key hole 58 corresponding to a key body 57a of a magnet key 57. Reference numeral 59 denotes a movable obstruction element. In this embodiment, three magnet pin tumblers 59a, 59b and 59c are used. For convenience of explanation, penetration holes are respectively labeled "1", "2", "3", "4" and "5" in order from the left side when the state of FIG. 16 is taken as a criterion. The magnet pin tumbler 59a is inserted into the penetration hole "1", any magnet pin tumbler is not into the penetration hole "2" and "3", and other magnet pin tumblers 59b and 59c are inserted into the penetration holes "4" and "5", respectively.

Thus, specific codes stored and set into a specific code memory circuit which will be described later are determined in dependency upon whether magnet pin tumblers are all inserted into respective penetration holes, or which penetration hole or holes should contain there into a magnetic pin tumbler or tumblers and which penetration hole or holes should be empty. It is to be noted that since the magnet pin tumbler serves as a movable obstruction element, it is desirable to insert an arbitrary element into any one of respective penetration holes. Meanwhile, these movable obstruction elements 59 are biased toward the grooves 56 of the inner tubular member by spring members 60 having a relatively weak spring force provided in the inner holes 54 of the outer tubular member in a locked state or before the magnet key 57 is inserted, respectively.

The magnet key 57 is comprised of a key body 57a inserted into the key hole, and a holding portion 57b integrally formed with the key body 57a. As shown in FIG. 18, at the upper side portion of the key body 57a, a plurality of magnets, five magnets g1, g2, g3, g4 and g5 in total in this embodiment, are embedded with a predetermined spacing therebetween. The polarities of these plural magnets g1 to g5 may be arbitrarily combined.

Reference numerals 61 denote a plurality of switch members each including at least a magnetic responsive switch provided in the key cylinder lock 51 of the key switch 1C and opened and closed in dependency upon insertion into the key hole 58 of the magnet key 57 and detachment therefrom, respectively. In this embodiment, as shown in FIG. 18, these switch embers are provided in correspondence with the number of outer holes 53 of the outer tubular member 52 and are suitably assembled into the outer holes 53, respectively. When a movable obstruction element 59 jumps up against the spring force of the spring member 60 from the groove 56 of the inner tubular member and becomes close to the magnetic responsive switch, the magnetic responsive switch detects this, whereby it is brought into a closed state. The magnetic responsive switch is the same structure as that of the first embodiment of this invention. Namely, a switch 11A using a fixed contact piece 11a as a fixed contact and a movable contact piece 11b as a movable contact as shown in FIG. 6, or a magnetic responsive lead switch 11B as shown in FIG. 7 may be used.

In this embodiment, switch members 61 using at least magnetic responsive switch 11B are suitably assembled into a plurality of outer holes 53 of the outer tubular member as shown in FIG. 16 or 18, and respective switch members 61 are connected in parallel with an information receive discrimination circuit which will be described later, and are protected by a cover member (not shown).

Reference numeral 62 denotes an information receive discrimination circuit connected in parallel with the plural switch members 61 as shown in FIG. 20 and for carrying out a receive discrimination with respect to presence and absence of power supply signals respectively delivered from these switch members 61. This information receive discrimination circuit 62 can discriminate between presence and absence of a power supply signal by so called binary rotation using logic values indicating respective two logical states, e.g., "1" when the circuit 62 has received a power supply signal, and "0" when it does not receive a power supply signal. Accordingly, in the case of this embodiment, electric signals of "1", "0", "0", "1" and "1" are delivered through connection cords from the switch members 61 to the information receive discrimination circuit 62, respectively. Thus, the information receive discrimination circuit 62 discriminates "a specific value" on the basis of these electric signals.

Respective switch members 61 are electrically connected to a battery 63 mounted in a vehicle. Thus, the above-mentioned power supply signals are delivered using the battery 63 mounted in vehicle as a power supply.

Reference numeral 64 denotes a specific code memory circuit for memorizing specific codes corresponding to combinations of open and closed states of the above-described switch membmers 61. These specific codes of the specific code memory circuit 64 are memorized and set in correspondence with the function that the information receive discrimination circuit 62 discriminates "a certain specific value" by two logic values of "1" and "0".

Accordingly, since magnet pin tumblers 59a, 59b and 59c assembled into the penetration holes of the key cylinder lock 51 are the first, fourth and fifth tumblers when counting from the left side in FIG. 18 in this embodiment, electric signals of "1", "0", "0", "1", and "1" are delivered from the respective switch members 61 to the information receive discrimination circuit 62. Thus, "a specific value" based on such a binary notation is referred to as a specific code.

Reference numeral 65 denotes an information collative judgment circuit for making a comparison and judgment as to whether or not "a specific value" as an information signal that the information receive discrimination circuit 62 has discriminated and "a specific code" as storage information that the specific code memory circuit stores therein are in correspondence with each other.

Reference numeral 66 denotes a central processing unit (CPU) operative to deliver output signals to respective supply elements essential for the operation of the engine for vehicle only when it has received, from the information collative judgment cirucit 68, the correspondence signal that an information signal and storage information are in correspondence with each other. As shown in FIGS. 15 and 20, an AND circuit 67 is connected to the CPU 66. In this embodiment, one input terminal of the AND circuit 67 is connected so that it can receive a correspondence signal from the information collative judgment circuit 65 based on information signals on the side of respective switch members 61, and the other input terminal of the AND circuit 67 is connected so that it can receive an output signal from an ignition coil of the key switch 1C or an ignition switch through the connection cord 68.

Reference numeral 69 denotes a fuel injection unit, reference numeral 70 an engine ignition unit, and reference numeral 71 respective essential elements such as a capacitor. These components are respectively connected to the CPU 66. In addition, reference numeral 72 denotes a starter motor.

In the above construction, as shown in FIGS. 16 and 17, before the magnet key 57 is not inserted into the key hole 58 of the key cylinder lock 51, a plurality of magnet pin tumblers 59a, 59b and 59c each serving as the movable obstruction element 59 are thrust by the spring members 60, so they are positioned within the grooves 56 of the inner tubular member, respectively, and a plurality of magnetic responsive switches 11B each serving as the switch member 61 are in an open state.

Thus, as shown in FIGS. 18 and 19, where the normal magnet key 57 is inserted into the key hole 58 of the key cylinder 51, magnetic forces of magnets g1, g4 and g5 embedded in the magnet key 57 are exerted on corresponding magnet pin tumblers 59a, 59b and 59c having the same polarity, respectively. As a result, the magnet pin tumblers 59a, 59b and 59c jump upwardly against the spring force of the spring members 60 from the grooves 56 of the inner tubular member 55, and become close to magnetic responsive switches 11B, respectively. Thus, these magnetic responsive switches 11B detect such changes, whereby they are brought into a closed state, respectively. As a result, power supply signals are delivered from the battery 63 mounted in vehicle as a power supply to the information receive discrimination circuit 62 through these magnetic responsive switches 11B, respectively.

Responding to this, "a specific value" that the information receive discrimination circuit 62 has discriminated is delivered to the information collative judgment circuit 65 through the CPU 66. The information collative judgment circuit 65 inquiries the specific code memory circuit 64 of whether or not the corresponding information signal is in correspondence with storage information therein to make a comparative collation to deliver an output signal to the CPU 66 only when the both information are in correspondence with each other. When the CPU 66 receives a correspondence signal from the information collative judgment circuit 65, it delivers output signals to respective supply elements 69, 70, and 71 essential for the operation of the engine for vehicle.

When the magnet key 57 is rotationally moved, so the key switch 1C is passed through the "ON" position, an output signal on the ignition coil side is inputted to the AND circuit 67, etc. through the connection cord 68 and the CPU 66. The AND circuit 67 discriminates that the output signal on the ignition coil side and the correspondence signal on the information collative judgment circuit 65 side are inputted at the same time to deliver an output signal to the engine ignition unit 70.

A controller 73, including the CPU 66 as the center, drives and controls the engine ignition unit 70, the fuel injection unit 69, and the like, and

further sets the magnet key 57 so that it is located at the position of "ST", whereby the starter motor 72 is rotated, so the engine is started.

On the other hand, where a key except for the normal magnet key 57 is inserted into the key hole 58 of the key cylinder lock 51, movable obstruction elements 59 are not entirely moved, or all magnet pin tumblers 59a, 59b and 59c do not jump upwardly, so respective magnetic responsive switches 11B are not entirely brought into a closed state, or one or some magnetic responsive switches 11B are not brought into a closed state. Accordingly, even if power supply signals are delivered from the power supply 63 to the information receive judgment circuit 62 through respective switch members 61, it is eventually judged at the information collative judgment circuit 65 that an information signal discriminated at the information receive discrimination circuit 62 is not in correspondence with storage information of the specific code memory circuit 64. As a result, no output signal is delivered to the AND circuit 67. Accordingly, even if the starter motor 72 is activated, the engine is not started.

It is to be noted that where a plurality of switch members 61 are provided in the key cylinder lock 51 also in the second embodiment, a design change may be made such that an arrangement similar to that of the different embodiment of the first embodiment is provided.

As is clear from the foregoing description, this invention provides the advantages recited below.

(1) It is prevented that the engine is started by unfair means such as a duplicate key, direct connection of electric wires, or the like.

(2) Since a normal magnet key inserted into the key cylinder lock of a vehicle and switch members provided in the key cylinder lock, which is opened and closed in response to insertion and detachment of the magnet key, there is no possibility that the magnet key is damaged and there is extremely little possibility that the mechanical key cylinder lock becomes out of order. Accordingly, there is little possibility that the engine is unable to be started by damage of the magnet key or trouble of the key cylinder lock.

(3) In the case of the first embodiment, it is sufficient to employ a scheme to use power supply signals delivered from the power supply as information, and to provide, at a suitable portion of the electric circuit, input signal discrimination means for cutting off output signals to supply elements essential for the operation of the engine for vehicle in the case of a key except for the normal magnet key. Accordingly, installation is very easy.

(4) In the case of the second embodiment, since the key cylinder lock and the controller including CPU can be arranged at places away from each other, and since the information receive discrimination circuit, the specific code memory circuit, and the information collative judgment circuit, etc. are connected to CPU, it is possible to securely prevent an unjust action such that, e.g., a thief directly connects wiring to drive the engine.

(5) By the number or the relationship of assembled positions of movable obstruction elements accommodated into a plurality of penetration holes of the key cylinder lock, it is possible to extremely easily set which switch member of plural switch members should be opened or closed.

(6) In the case of the embodiment using a key cylinder lock wherein magnetic responsive switches as respective switch members are used, and the magnetic responsive switches are caused to be in a closed state through jumping up of magnet pin tumblers by inserting the magnet key into the key hole, as long as the magnet key is inserted into the key hole, since respective magnet pin tumblers are supported on the outer circumferential surface of the inner tubular member, even if the magnet key is rotationally moved, such a closed state is continued.

Accordingly, there is no necessity of using other members such as signal hold means.

Claims

1. A burglarproof device for a vehicle comprising:

a key cylinder lock for the vehicle including an outer tubular member and an inner tubular member rotatably provided within said outer tubular member,

a normal magnet key adapted to be inserted into said inner tubular member,

a switch member provided in said outer tubular member, which is opened and closed in response to insertion and detachment of said magnet key, and

input signal discrimination means for cutting off output signals to power supply elements essential for the operation of an engine for the vehicle in the case of a key except for said normal magnet key using, as information, a power supply signal delivered from a power supply through said switch member.

2. A burglarproof device for a vehicle comprising:

a key cylinder lock for the vehicle including an outer tubular member and an inner tubular member rotatably provided within said outer tubular member,

a normal magnet key adapted to be inserted into said inner tubular member,

a plurality of switch members provided in said outer tubular member, which is opened and closed in response to insertion and detachment of said magnet key,

an information receive discrimination circuit for carrying out a receive discrimination with respect to presence and absence of power supply signals respectively delivered from said switch members,

an information collative judgment circuit adapted to receive an information signal from said information receive discrimination circuit to make a comparative collation between storage information provided by making reference to a specific code memory circuit in which specific codes corresponding to combinations of open and closed states of said switch members are stored in advance and said information signal, and

a central processing unit operative to deliver output signals to supply elements essential for the operation of an engine for the vehicle only when it receives, from said information collative judgment circuit, a correspondence signal indicating that said storage information and said information signal are in correspondence with each other.

3. A burglarproof device as set forth in claim 1 or 2, wherein said switch member is comprised of a magnetic responsive switch, and is brought into a closed state directly or through jumping up of a magnet pin tumbler by inserting said magnet key into a key hole.

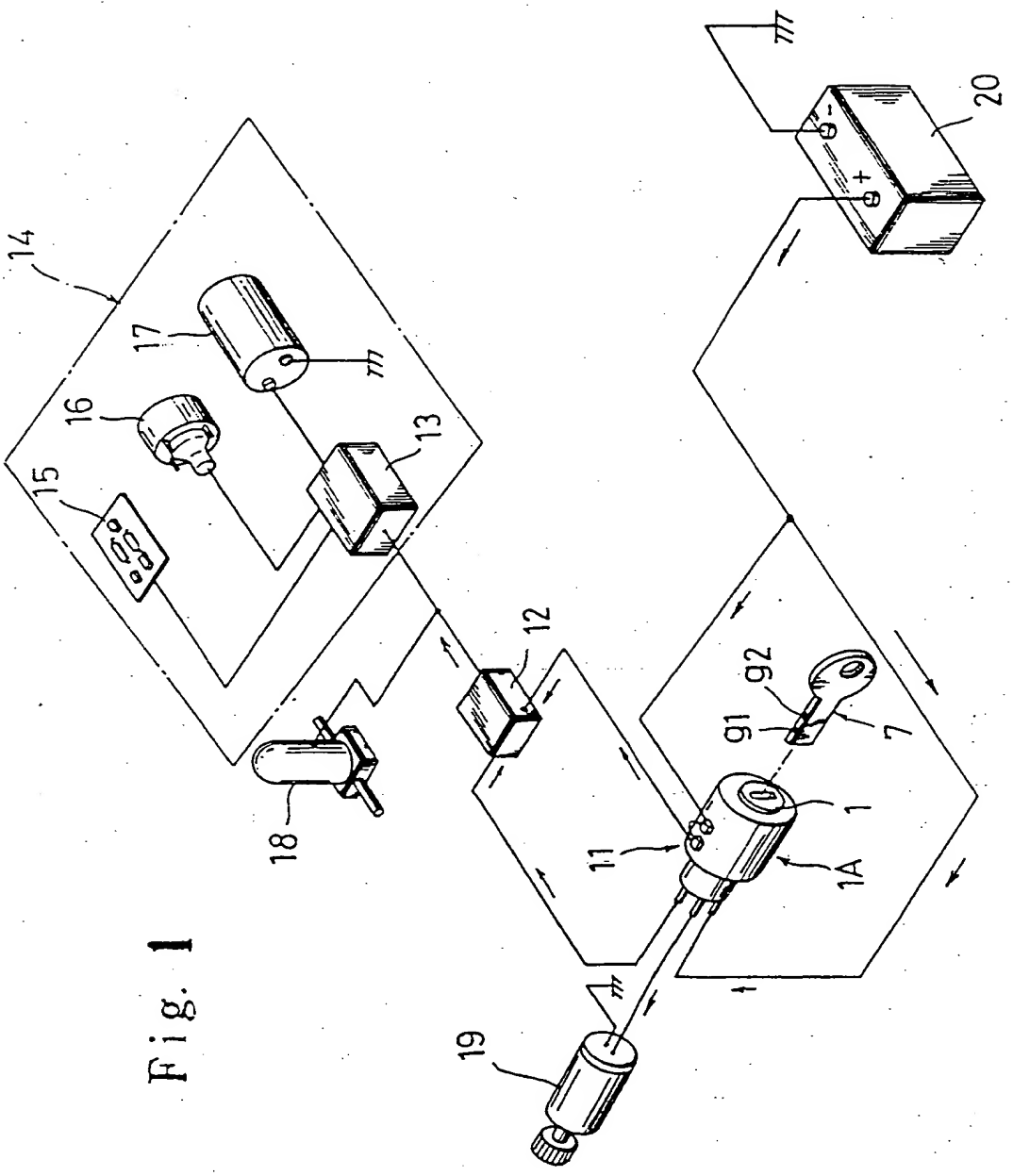


Fig. 1

Fig. 2

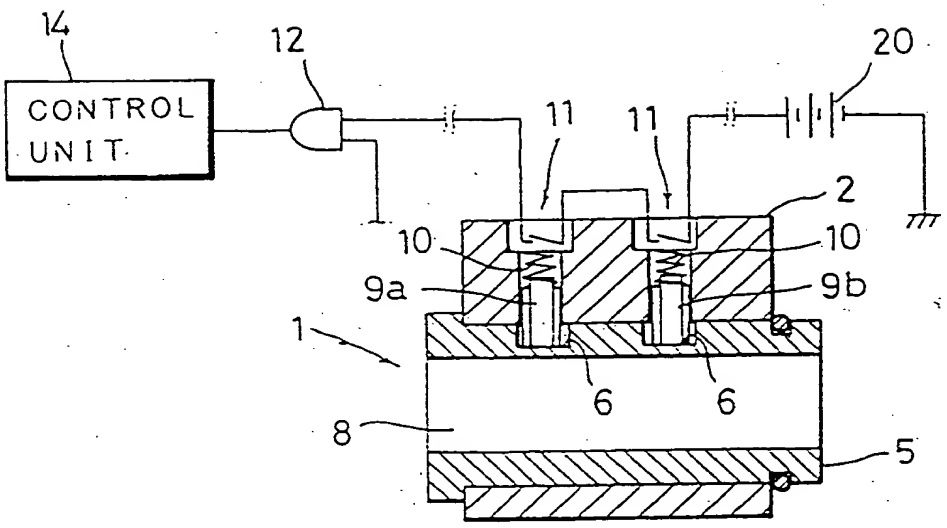


Fig. 3

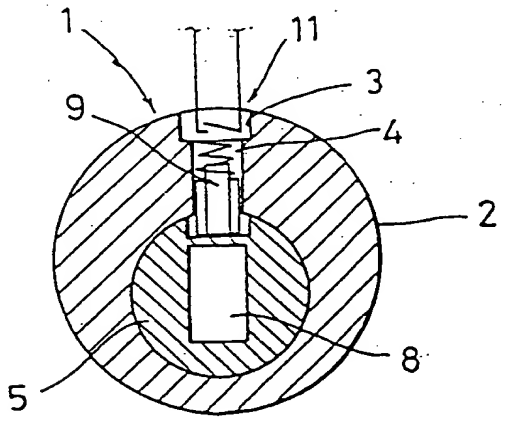


Fig. 4

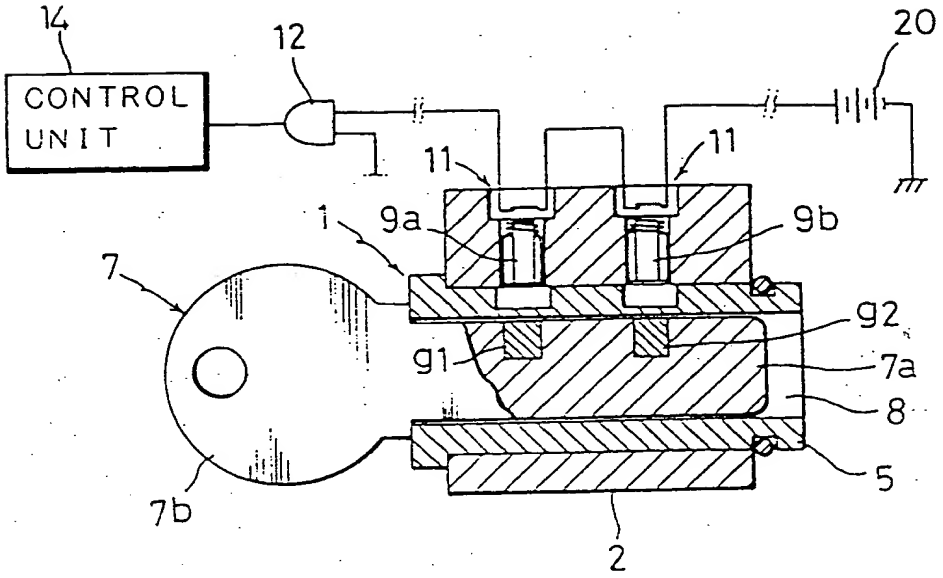

14
CONTROL UNIT
12
20
11
11
1
9a
9b
7
g2
g1
7a
8
5
7b
2

Fig. 5

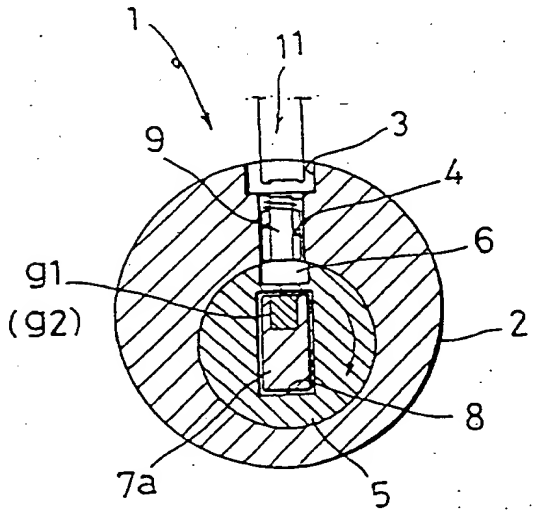

1
11
9
3
4
6
g1
(g2)
2
8
7a
5

Fig. 6

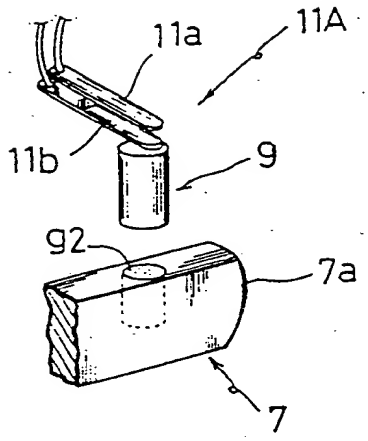


Fig. 7

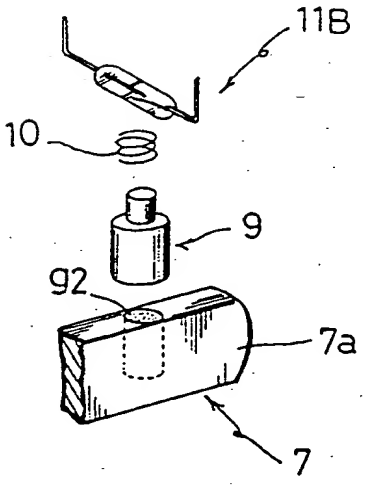


Fig. 8

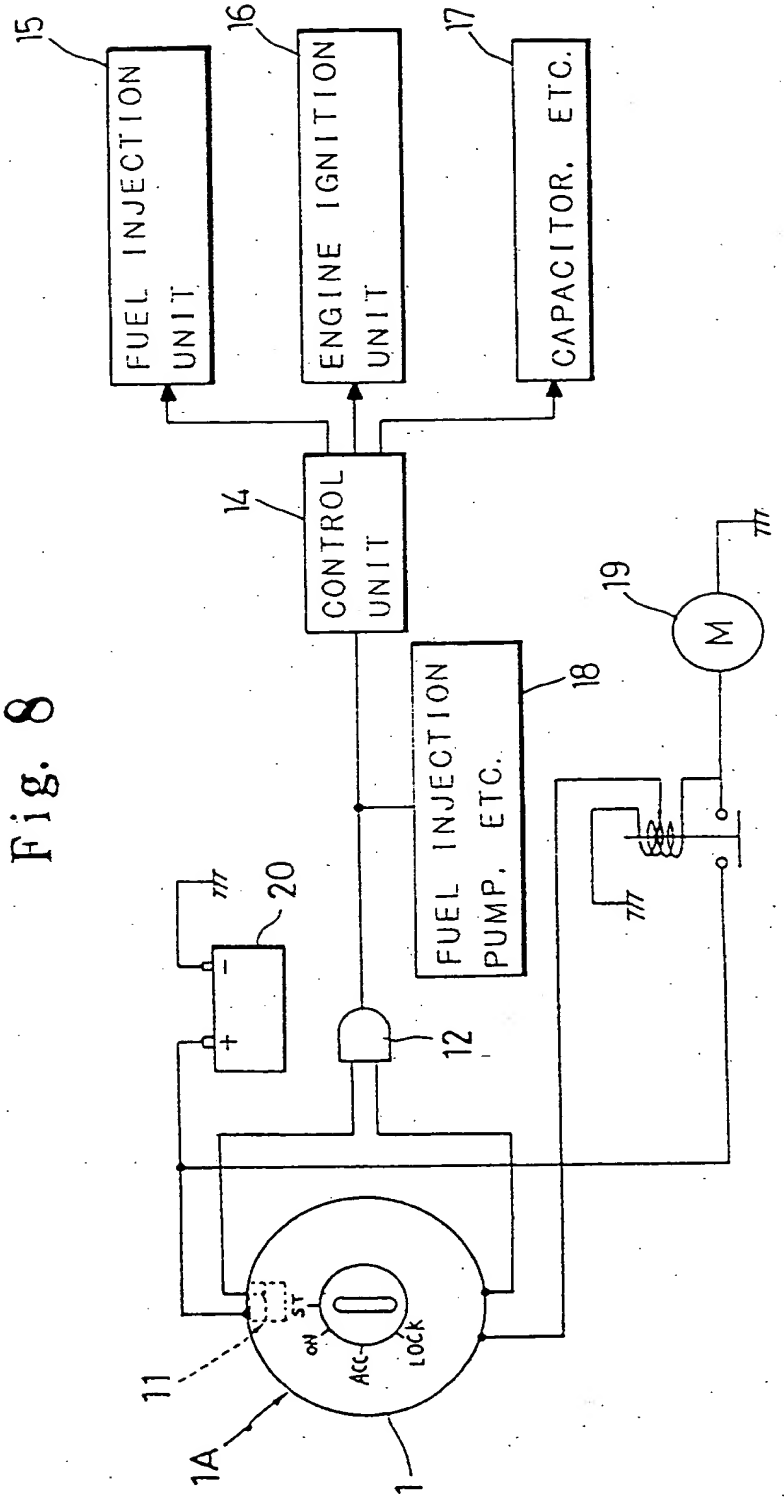

15
FUEL INJECTION UNIT
16
ENGINE IGNITION UNIT
17
CAPACITOR, ETC.
14
CONTROL UNIT
19
M
18
FUEL INJECTION PUMP, ETC.
20
12
11
1A
1
ST
ON
ACC
LOCK

Fig. 9

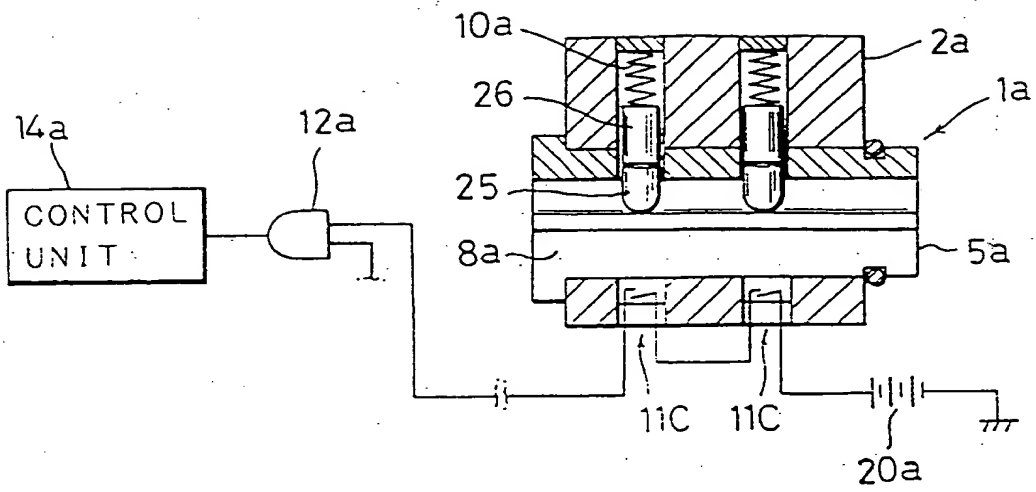

10a
2a
26
1a
14a
12a
CONTROL UNIT
25
8a
5a
11C
11C
20a

Fig. 10

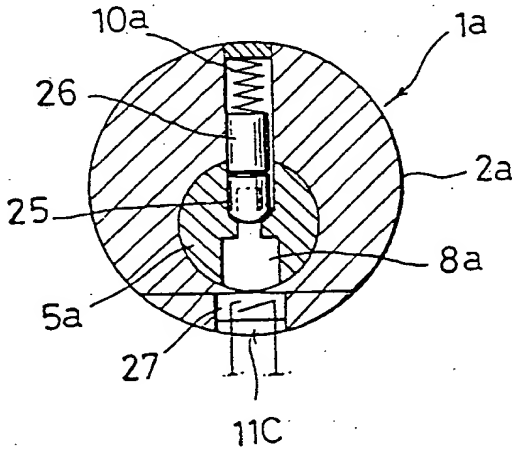

10a
1a
26
2a
25
8a
5a
27
11C

Fig. 11

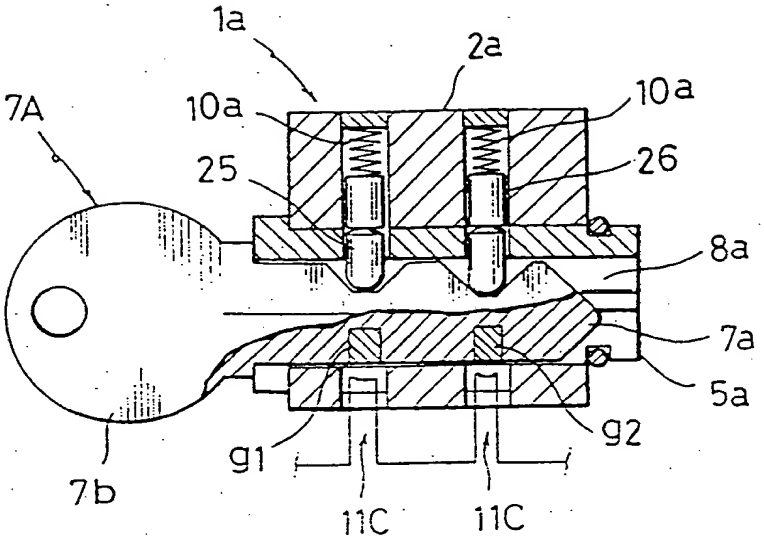

1a
2a
10a
7A
10a
25
26
8a
7a
5a
g2
g1
7b
11C
11C

Fig. 12

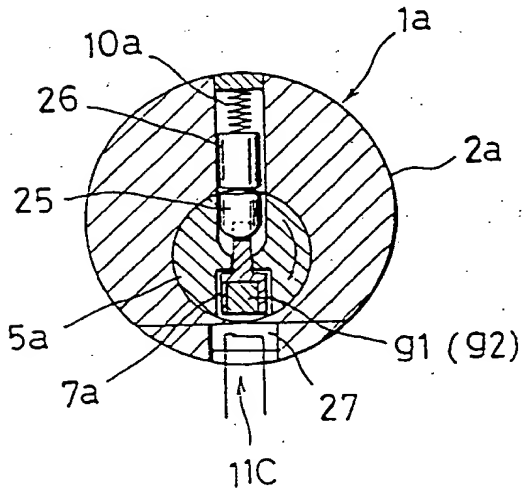

1a
10a
26
2a
25
5a
g1 (g2)
7a
27
11C

Fig. 13

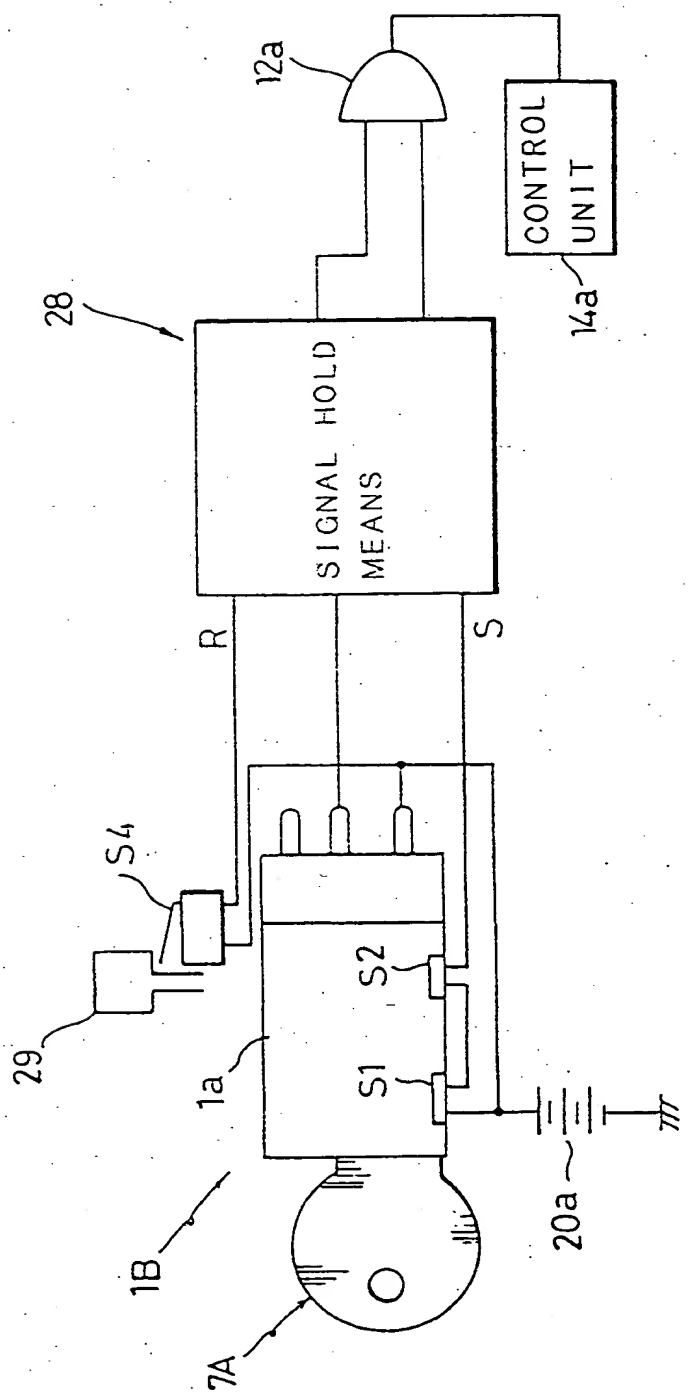
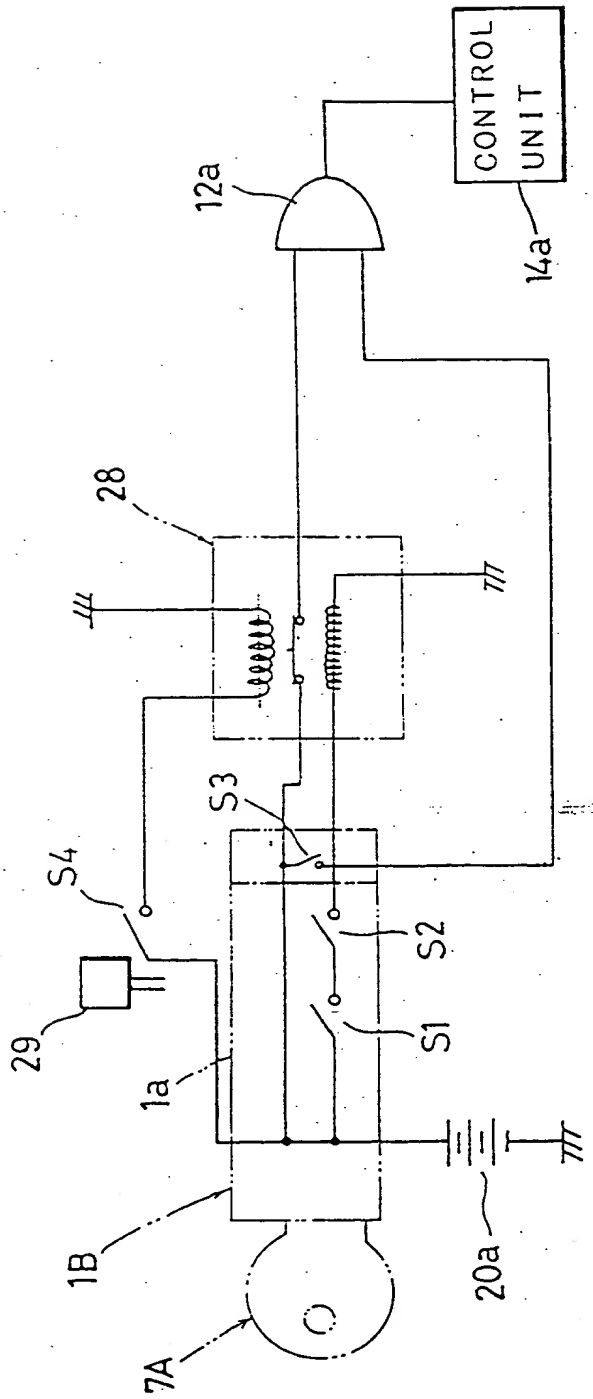

12a
CONTROL UNIT
14a
28
SIGNAL HOLD MEANS
R
S
S4
29
S2
1a
S1
20a
1B
7A

Fig. 14



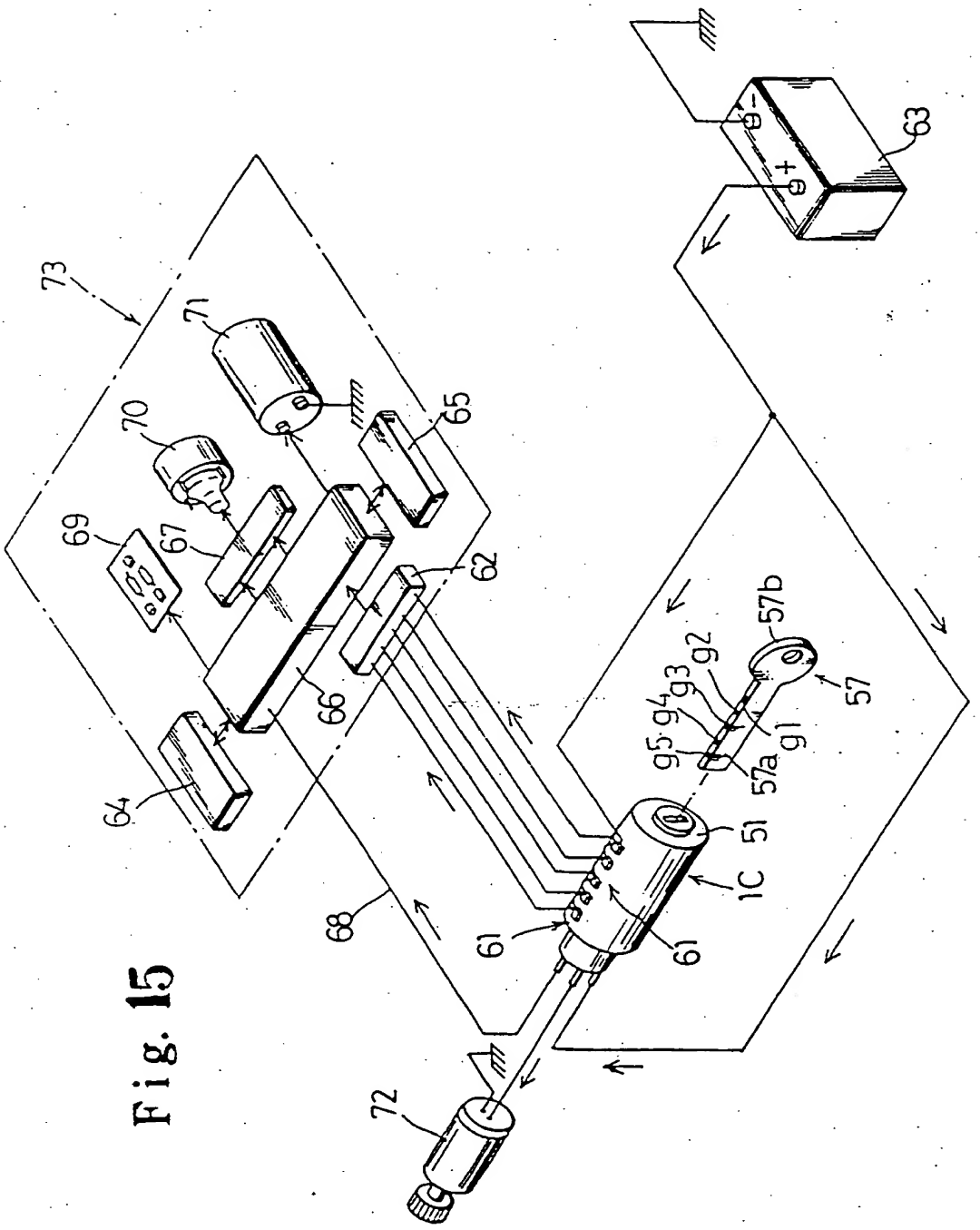

73
71
70
65
69
67
62
66
64
63
57b
57
g2
g3
g4
g5
g1
57a
51
1C
61
61
68
72

Fig. 15

Fig. 16

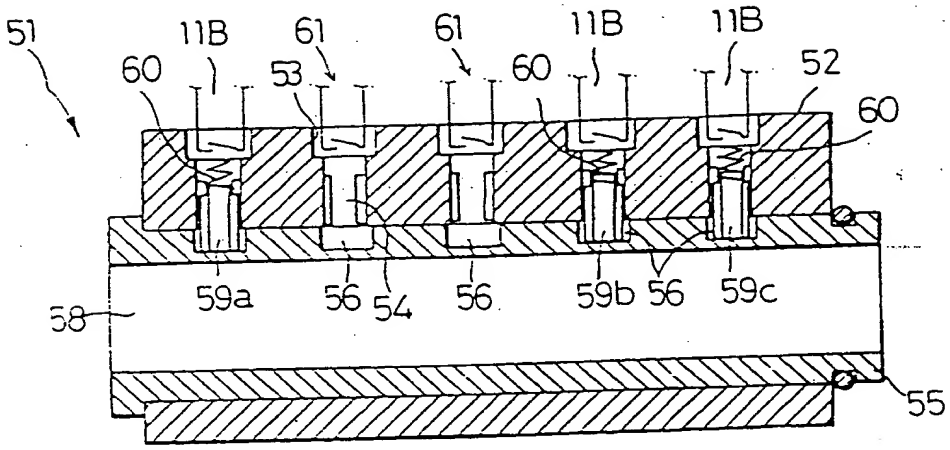

51
11B
61
61
11B
11B
60
53
60
52
60
59a
56
54
56
59b
56
59c
58
55

Fig. 17

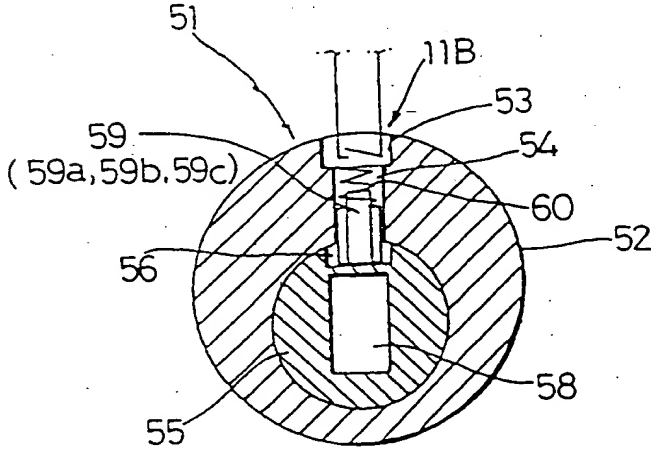

51
11B
53
59
(59a,59b,59c)
54
60
52
56
58
55

Fig. 18

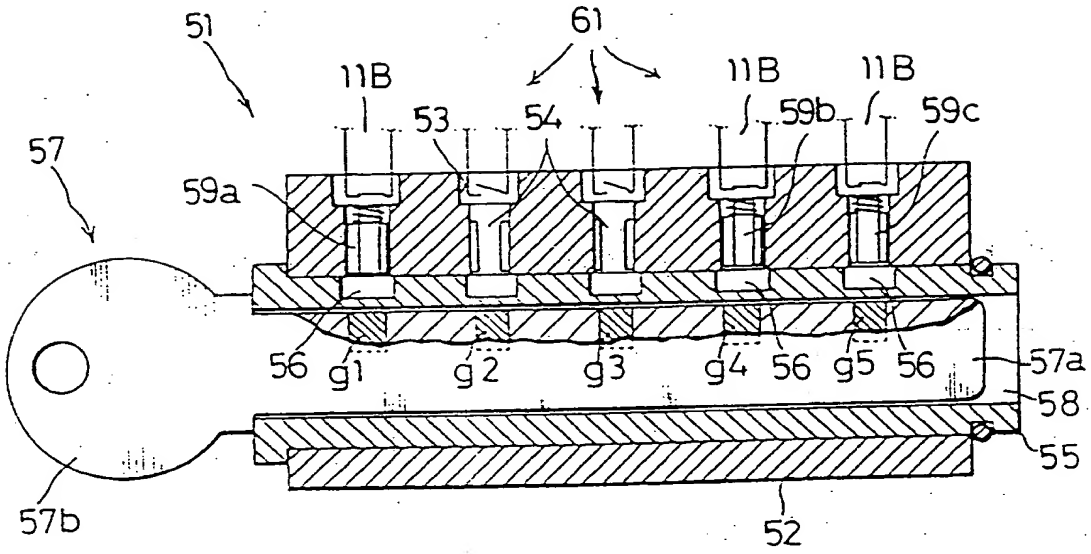

51
61
11B
11B
11B
53
54
59b
59c
57
59a
56
g1
g2
g3
g4
56
g5
56
57a
58
55
57b
52

Fig. 19

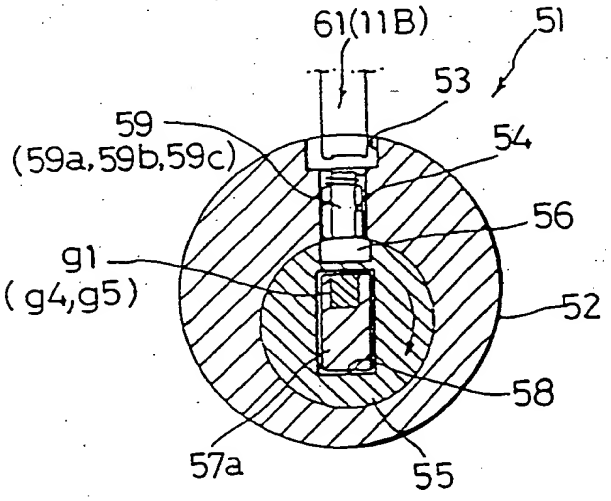
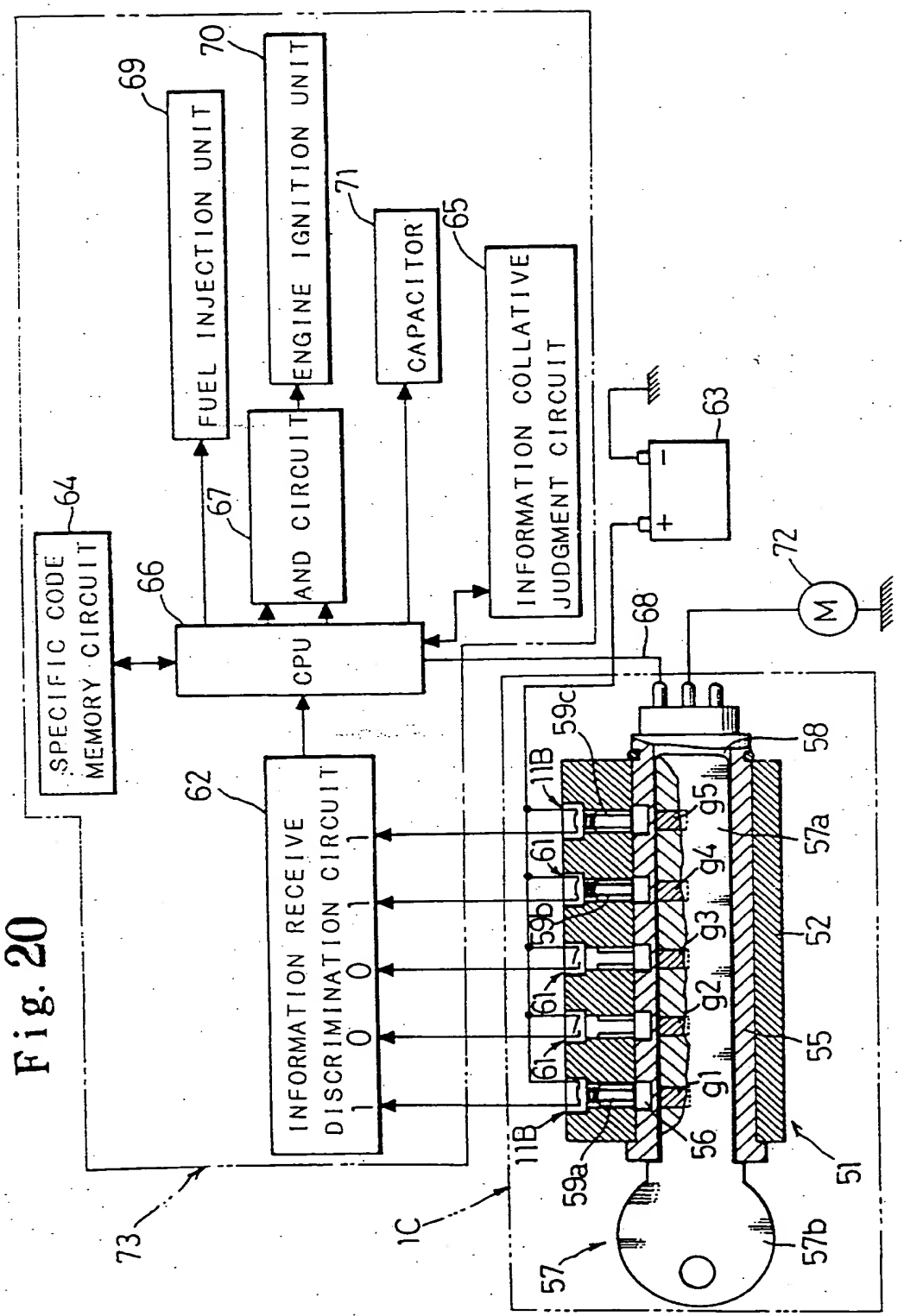

61(11B)
51
53
59
(59a,59b,59c)
54
56
g1
(g4,g5)
52
58
57a
55

Fig. 20


SPECIFIC CODE MEMORY CIRCUIT
64
CPU
66
FUEL INJECTION UNIT
69
AND CIRCUIT
67
ENGINE IGNITION UNIT
70
CAPACITOR
71
INFORMATION COLLATIVE JUDGMENT CIRCUIT
65
INFORMATION RECEIVE DISCRIMINATION CIRCUIT
62
1 0 0 1 1
63
72
M
68
58
59c
11B
61
59b
59a
56
g1
g2
g3
g4
g5
57a
52
55
51
57b
57
73
1C